Groundwater contamination and the risk of arsenic poisoning in Pakistan

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Arsenic is a heavy metal found in combination with many minerals. It can leach into groundwater from adjacent rocks and soil. Recent studies[1] show that there is increasing groundwater arsenic contamination in large areas of the Indus plain in Pakistan, with levels increasing to more than 50 micrograms per litre, much higher than the World Health Organisation's guideline of 10 micrograms per litre. This arsenic can enter the general population via direct consumption of contaminated water, or through its use in the agricultural industry. Rice (a staple diet in Pakistan) shows accumulation of high levels of arsenic.[2] Similar groundwater contamination in the 1990s occurred in Bangladesh and India. This contamination is the basis of the fact that of the 200 million people exposed to over 10 micrograms per litre of arsenic, most reside in Bangladesh, Nepal, Vietnam, and India.

Arsenic can have significant carcinogenic effects, including skin, lung and bladder carcinoma, on both chronic and acute exposure.[3] It has also been associated with cardiac and neurodevelopmental disorders, as well as new studies associating it with diabetes mellitus.[2]

Studies assessing the risk of these effects have been carried out in Iran,[4] and we believe that similar studies should be conducted to further investigate these effects in Pakistan, in light of the increasing arsenic contamination. Studies on the amount of groundwater contamination have been conducted, but studies to assess the effects of this rapidly increasing contamination in the affected region of Punjab have not been conducted recently. Lessening rice consumption could also be useful in reducing these negative effects, but considering how it is a major dietary source, this approach likely would not have much effect. Certain microbes[5] (Streptomyces, Rhobdococcus, etc) can reduce the uptake of heavy metals, such as arsenic, by rice and other plants. Cultivation of rice aerobically, and use of certain fertilizers such as silicon, can also be used to reduce the arsenic accumulation in rice. Reverse osmosis, ultra-filtration, or ion exchange can be used to remove arsenic from water meant for human consumption. We suggest the government implement the aforementioned measures to protect the populace.

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